Mauro C. Escobar Santoro – CV

Address	51, bd de Vaugirard 75015 Paris, France	**Mobile Phone**	+33 7 68 89 65 00
Date of Birth	5^{th} May 1988	**Email**	escobar@lix.polytechnique.fr
Nationality	Chilean, Italian	**Web**	mauro-escobar.github.io

Research Interests

Main interests on network optimization, transport systems, energy optimization, and applications. More generally, mathematical programming, nonlinear optimization, and combinatorial optimization.

During my Ph.D. thesis, I worked on the optimal power flow problem of electrical networks. In particular, understanding and coding solutions under its original formulation (the non-linear non-convex AC-OPF), formulating and studying the feasibility of cyber-physical attacks and consequential defense mechanism against them, and performing statistical analyses on power grid measurements.

Education

2014 - 2019 Ph.D. in Operations Research - Columbia University

Industrial Engineering & Operations Research Department. Advisor: Daniel Bienstock.
Thesis defense: May 2019.

2015 Master of Science - Columbia University

Industrial Engineering & Operations Research Department. GPA: 4.08.

2013 Mathematical Engineer - Universidad de Chile

Thesis Title: *Analysis of Network Coding Algorithms.*
Supervisor: Marcos Kiwi. Jury: José Correa, Jaime San Martín.

2006 - 2011 Bachelor of Engineering Sciences in Mathematics - Universidad de Chile

Publications

- **Mathematical Programming formulations for the AC-OPF problem, 2020**

  with Daniel Bienstock, Claudio Gentile, and Leo Liberti. *In 4OR, vol. 18, no. 3, pp. 249-292.*
  DOI: 10.1007/s10288-020-00455-w
- **Stochastic Defense Against Complex Grid Attacks, 2020**

  with Daniel Bienstock. *In IEEE Trans. on Control of Network Systems, vol. 7, no. 2, 842-854.*
  DOI: 10.1109/TCNS.2019.2949908
- **Security and Statistics on Power Grids, 2019**

  Ph.D. thesis supervised by with Daniel Bienstock.
  DOI: 10.7916/d8-987s-6q56
- **Learning from Power System Data Stream, 2019**

  with Daniel Bienstock and Michael Chertkov. *In 2019 IEEE Milan PowerTech.*
  DOI: 10.1109/PTC.2019.8810950
- **Computing Undetectable Attacks on Power Grids, 2017**

  with Daniel Bienstock. *SIGMETRICS Performance Evaluation Review vol. 45, no. 2, 115-118.*
  DOI: 10.1145/3152042.3152077
- **Analysis of Network Coding Algorithms (in Spanish), 2012**

  Engineering thesis supervised by Marcos Kiwi. www.tesis.uchile.cl/handle/2250/112309

Talks

Sept 2020 *Integer Formulation for Computing Transaction Aggregation to Detect Credit Card Fraud*
work Claudia D'Ambrosio, Leo Liberti, and Sonia Vanier. 2020 CTW, *(online)* Italy.

June 2019 *Learning from power system data stream*
work with Daniel Bienstock and Michael Chertkov. 2019 IEEE PowerTech, Milan, Italy.

Mar 2019 *Cyber-Physical Attacks on Power Grids and Covariance Defense*
work with Daniel Bienstock. 2019 Risk Day, Cambridge, UK.

Nov 2018 *Cyber-Physical Attacks on Power Grids and Covariance Defense*
work with Daniel Bienstock. 2018 INFORMS Annual Meeting, Phoenix, AZ.

July 2018 *Cyber-Physical Attacks on Power Grids under the AC model and Stochastic Defense*
work with Daniel Bienstock. SIAM - Network Science 2018, Portland, OR.

July 2018 *Undetectable Cyber-Physical Attacks on Power Grids under the AC model*
work with Daniel Bienstock. EURO 2018, Valencia, Spain.

July 2018 *Machine Learning with PMU signals*
work with Daniel Bienstock. ISMP 2018, Bordeaux, France.

Nov 2017 *Analysis on Power Grid Attacks*
work with Daniel Bienstock. 2017 INFORMS Annual Meeting, Houston, TX.

Nov 2015 *On Routing Policies for Synchronized Queues*
work with Mariana Olvera-Cravioto. 2015 INFORMS Annual Meeting, Philadelphia, PA.

Awards

- **Fulbright Scholar (2013 - 2018)**
  Fulbright U.S.A.-Chile
  Grant conferred to support application and development of the doctoral studies.
- **Outstanding Student Prize (2006 - 2010)**
  Engineering School, Universidad de Chile
  Grant conferred to the best 10% students of every year.
- **Merit Grant: Sixth Place, Free Scholarship for the First Year (2006)**
  Engineering School, Universidad de Chile
  Grant conferred to the first 10 from a total of 700 students that enter to the Engineering program.
- **Maximum Score in Mathematics (2005)**
  National Entrance Exam to Chilean Universities
  From a total of 182,761 students taking the exam, 234 obtained maximum score in Mathematics.
- **First Place in Mathematics (2005)**
  Knowledge Olympics, Universidad de Santiago
  National Olympics for last year high-school students.
- **Second Place in Championship (2005)**
  Mathematics National Championship
  National Mathematics Olympics for high-school students.

Teaching Experience

2020 - Ecole polytechnique, Department of Computer Science
Teaching Coordinator for:

- Decision Theory, with Applications to Energy Systems: Spring 2020.

2014 - 2016 Columbia University, Industrial Engineering & Operations Research Department
Teaching Assistant for:

- Introduction to OR, Stochastic Models: Fall 2014,
- Introduction to OR, Stochastic Models (Master): Fall 2015, Spring 2016, Fall 2016.

2008 - 2012 Universidad de Chile, Mathematical Engineering & Computer Science Departments
Teaching Assistant for:

- Introduction to Calculus: Fall 2008,
- Introduction to Algebra: Fall 2009,
- Linear Algebra: Spring 2008,
- Single Variable Calculus: Spring 2009,
- Multi-variable Calculus: Fall 2010, Fall 2011,
- Advanced Calculus: Spring 2008, Spring 2009,
- Optimization: Spring 2010,
- Probability: Fall 2009,
- Measure Theory: Spring 2010,
- Graph Theory: Spring 2011,
- Algorithm and Data Structures: Fall 2010,
- Discrete Mathematics for Computer Science: Fall 2011, Spring 2011, Fall 2012.

Jan 2008 Universidad de Chile, Summer School
Teaching Assistant for a pre-calculus course for high-school students.

Professional Experience

2019 - Computer Science Laboratory, Ecole polytechnique, France
Postdoc

Theoretical analysis and implementation of mechanisms to detect and prevent credit card fraud.

2014 Industrial Engineering Department, Universidad Adolfo Ibáñez, Chile
Research Assistant

Implementation of an scheduling algorithm for trucks going to a copper mine, special safety conditions must be satisfied.

2013 Center for Mathematical Modeling, Universidad de Chile
Research Assistant

Study and mathematical modeling of the energy required by an underground train over its trajectory by means of minimum cost speed curves.

2010 - 2012 Center for Mathematical Modeling, Universidad de Chile
Research Assistant

Development of a social behavior modeling and simulation framework for assessing strategies in crisis response.

Scientific Events Attendance

- CTW 2020, (online) Italy.
- IEEE PowerTech 2019, Milan, Italy.
- Risk Day 2019, Cambridge, United Kingdom.
- INFORMS Annual Meetings 2018 (Phoenix, AZ), 2017 (Houston, TX), 2015 (Philadelphia, PA).
- SIAM Network Science 2018, Portland, OR.
- EURO 2018, Valencia, Spain.
- ISMP 2018, Bordeaux, France.
- MATCH-UP 2017, Microsoft Research New England, Cambridge.
- Discrete Mathematics Summer School: 2009, 2010, 2011, 2012, 2013, 2014, and 2017.
  Universidad de Chile – Valparaíso, Chile.
- IPCO 2013, Valparaíso, Chile.
- 1st Latin American Theoretical Informatics School 2012.
  Universidad Católica San Pablo – Arequipa, Peru.
- LATIN 2012, Arequipa, Peru.

Skills & Interests

- **Programming Languages**

  Python, Matlab, HTML.

- **Languages**

  Spanish (native), English (fluent), Italian (intermediate+), French (intermediate).

- **Interests**

  Swimming, Cycling, Running, Traveling.

Reference

Name	Daniel Bienstock Liu Family Professor of Industrial Engineering & Operations Research Columbia University
Contact	dano@columbia.edu

Name	Leo Liberti CNRS Research Director (and part-time professor) at CNRS LIX Ecole polytechnique, France
Contact	liberti@lix.polytechnique.fr